

Table S1. Initial tree attributes and soil characteristics for trial sites for
2016 and 2017 Paclobutrazol trials

Trial: Paclobutrazol 2016				
	Location			
	Allegan, MI	Manton, MI	Horton, MI	Sidney, MI
Initial Height (m) (se)	1.40 (0.01)	1.63 (0.02)	1.25 (0.01)	1.38 (0.01)
Percent of trees with cones (%)	23.67%	11%	4%	NA
Surface soil texture	Loamy sand	Loamy sand	Sandy loam	Loamy sand
Drainage class	Well drained to excessively drained	Well drained to somewhat excessively drained	Well drained	Moderately well drained to well drained
Trial: Paclobutrazol 2017				
	Location			
	Allegan, MI	Manton, MI	Horton, MI	Sidney, MI
Initial Height (m) (se)	1.27 (0.02)	1.61 (0.01)	0.92 (0.01)	1.60 (0.01)
Percent of trees with cones (%)	0.33%	9%	1%	3%
Surface soil texture	Loamy sand	Loamy sand	Sandy loam	Loamy sand
Drainage class	Well drained to excessively drained	Well drained to somewhat excessively drained	Well drained	Moderately well drained to well drained

Table S2. Initial tree attributes and soil characteristics for trial sites 2018 Foliar PGR trials				
	Location			
	Allegan, MI	Manton, MI	Horton, MI	Sidney, MI
Initial Height (m) (se)	1.80 (0.01)	1.41 (0.02)	1.77 (0.02)	1.89 (0.01)
Surface soil texture	Loamy fine sand	Loamy sand	Sandy loam	Loamy sand
Drainage class	Excessively drained	Well drained to somewhat excessively drained	Well drained	Moderately well drained to well drained

Table S3. Products used for Michigan State University Plant Growth Regulator (PGR) trials

Product/manufacturer	Active ingredient	Application
Cambistat®/ Rainbow Treecare Scientific Advancements	Paclobutrazol	Soil Injection
Trimtect®/ Rainbow Treecare Scientific Advancements	Paclobutrazol	Foliar
Citiadel®/ Fine Americas, Inc	Chlormequat Chloride	Foliar
Concise®/ Fine Americas, Inc	Uniconazole-p	Foliar
Dazide®/ Fine Americas, Inc	Daminozide	Foliar

Table S4. Mean bud counts on terminal leader and mean terminal bud density of Fraser fir trees treated with three rates soil applied paclobutrazol, treated with foliar applied paclobutrazol, or left untreated (Control). Top: trees treated with soil application in 2016 or foliar-treated annually 2016-2018. Bottom: trees treated with soil application in 2017 or foliar-treated annually 2017-2019.

Treatments initiated in 2016						
Treatment	Leader bud counts (buds per leader)			Bud density (buds cm ⁻¹)		
	2017	2018	2019	2017	2018	2019
Control	16.1a	17.7a	16.7	0.41bc	0.39	0.35
100 ml	15.2ab	16.5abc	16.6	0.43ab	0.38	0.36
200 ml	14.1bc	15.4bc	15.3	0.42b	0.38	0.34
300 ml	13.9c	15.2c	15.5	0.46a	0.38	0.37
Foliar	13.0c	16.9ab	15.7	0.39c	0.38	0.36

Treatments initiated in 2017						
Treatment	Leader bud counts (buds per leader)			Bud density (buds cm ⁻¹)		
	2018	2019	2020	2018	2019	2020
Control	15.6a	18.6a	17.9a	0.37ab	0.38	0.41
100 ml	14.1ab	16.8b	17.1ab	0.38ab	0.37	0.40
200 ml	14.4ab	16.1ab	16.4ab	0.39a	0.37	0.40
300 ml	13.8b	15.2b	16.4ab	0.38ab	0.38	0.41
Foliar	14.4ab	15.8ab	15.6b	0.35b	0.37	0.40

Note: Means within a column indicated by the same letter are not different at $p < 0.05$. Mean separation by Tukey's HSD test.

Table S5. Mean bud counts on terminal leader and mean bud density of Fraser fir trees treated with four plant growth regulators or left untreated (Control). Each PGR was applied once (1×) or applied a second time approximately 1 week later (2×). Foliar treatments were applied annually in 2018 and 2019.

Treatment	Leader bud count (buds per leader)		Bud density (buds cm ⁻¹)	
	2019	2020	2019	2020
Control	15.7abc	16.1a	0.37ab	0.38
Chlormequat chloride (1×)	15.7ab	15.4a	0.36ab	0.36
Chlormequat chloride (2×)	15.5abc	15.4a	0.36ab	0.38
Uniconazole-p (1×)	16.4a	16.3a	0.37ab	0.36
Uniconazole-p (2×)	14.8abc	14.5ab	0.35ab	0.35
Daminozide (1×)	15.3abc	14.8ab	0.33b	0.36
Daminozide (2×)	15.4abc	14.7ab	0.35ab	0.37
Paclobutrazol (1×)	13.7bc	14.8ab	0.37ab	0.40
Paclobutrazol (2×)	13.3c	11.8c	0.38a	0.38

Note: Means within a column indicated by the same letter are not different at $p < 0.05$. Mean separation by Tukey's HSD test.